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Attorneys for Defendants
VISA U.S.A. INC. and
VISA INTERNATIONAL SERVICE ASSOCIATION

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

OAKLAND DIVISION

SAFECLICK, LLC, an Iowa limited liability company

Plaintiff,

v.

VISA U.S.A. INC., a Delaware corporation, and VISA INTERNATIONAL SERVICE ASSOCIATION, a Delaware corporation

Defendants.

Case No.: C03-05865 SBA ADR

DEFENDANTS' ADDENDUM TO THE JOINT CLAIM CONSTRUCTION STATEMENT

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Pursuant to Patent Local Rule 4-3, Defendants Visa International Service Association and Visa U.S.A. Inc. (collectively, "Visa") hereby submit the following Addendum to the Joint Claim Construction and Prehearing Statement proffering constructions for disputed claim terms of U.S. Patent No. 5,793,028 to Wagener et al. (the "'028 patent").

This Addendum addresses only those terms remaining in dispute. By agreement of the parties, Safeclick is simultaneously filing an Addendum addressing the same terms.

I. Claim Constructions

Visa's preliminary claim constructions are provided in the claim chart attached as Exhibit A. Visa expressly reserves the right to amend and expand the claim chart as our efforts to prepare a joint claim construction proceed.

Visa has previously served its Preliminary Invalidity Contentions, which list reasons for invalidating the asserted claims of the '028 patent based on indefiniteness. The failure to mention such a reason for invalidity in this Preliminary Claim Construction does not waive any argument set forth in the Preliminary Invalidity Contentions, as the reasons listed in the Preliminary Invalidity Contentions for finding invalidity based on claim indefiniteness do not require claim construction in order to result in a finding of invalidity. Resolution of Visa's contentions regarding claim invalidity can be addressed in proceedings separate from the claim construction process, and need not necessarily be addressed in the claim construction process.

II. Intrinsic and Extrinsic Evidence

Visa's claim constructions are based upon the intrinsic and extrinsic evidence identified below and cited in the claim chart attached hereto as Exhibit A. Additionally, Visa's claim constructions are also based upon the following intrinsic and extrinsic evidence:

a. the '028 file history, including all references identified and considered by the Examiner during the examination of the '028 patent application;

b. all references identified and distinguished by the applicants of the '028 patent during prosecution;

c. prior art references cited in Visa's Preliminary Invalidity Contentions and prior art produced to Safeclick by Visa; and

d. expert testimony as described below.

This designation is preliminary. As discovery and investigation are ongoing, Visa specifically reserves the right to identify additional intrinsic and extrinsic evidence at any time.

III. Expert Witness Declaration

Visa's claim constructions are further based upon the knowledge and understanding of one of ordinary skill in the art at the time of filing of the '028 patent application. Visa may rely upon a declaration by Dr. Michael I. Shamos as to the understanding of one of skill of the art at the time of filing of the '028 patent application of the terms: "transmitting … to … from," "including a public identification code uniquely identifying a computer," "verifier computer," "in response to," "indicating one of a valid electronic transaction and an invalid electronic transaction," and "the acknowledgement response including the private identification code uniquely identifying the transactionor computer". Dr. Shamos's resume is attached as Exhibit B.

DATED: September 3, 2004

Respectfully submitted,

HELLER EHRMAN WHITE & McAULIFFE LLP

By _____

CHRISTIAN E. MAMMEN

Attorneys for Defendants
VISA U.S.A. INC. and VISA INTERNATIONAL SERVICE ASSOCIATION.

Exhibit A

Chart of Preliminary Claim Constructions

Notes Regarding Chart

1. In accordance with Patent Local Rule 4.2 of the Northern District of California, the following chart identifies Visa's preliminary claim constructions with citations to supporting intrinsic and extrinsic evidence.

2. Unless a second construction is provided for a term, each term is assumed to have the same meaning in all subsequent uses throughout the claims.

Claim Element	Visa Claim Terms	Visa Claim Constructions
6. A method comprising the steps of:		
transmitting a transaction initiation request requesting the initiation of an electronic transaction **to** a transactionee computer **from** a transactionor computer, the transaction initiation request **including** a **public identification code uniquely identifying the transactionor computer**, and a public identification code uniquely identifying a transactionee computer;	**transmitting…to… from (transmitting… from…to)** **including** **public identification code uniquely identifying the transactionor computer**	**transmitting…to… from (transmitting… from…to)** ***Construction:*** *sending, via any communication link, from the sender (e.g., from the source address) to the receiver (e.g., to the destination address) and not through any other party* ***Support***: Ordinary meaning of the words consistent with specification definitions, disclaimers in prosecution history and the intrinsic evidence. Transmit: 1. To send from one person, thing, or place to another; convey. 4. Electronics. To send (a signal), as by wire or radio. (The Am. Heritage Dictionary of the English Language, 1975.) Transmit: To send a program, message, or other information from one location to another. (Modern Dictionary of Electronics, 6th ed., 1992.) Transmit (1)(computing machines). To move data from one location to another location. (Standard Dictionary of Electrical and Electronics Terms, 4th ed., ANSI/EEEI Std 100-1988, 1988.) Transmit: To send a message, program, or other information to a person or place by wire, fiber-optic cable, radio, or other means. (McGraw-Hill Electronics Dictionary, 5th ed., 1994.) To: 1. In a direction toward; so as to approach or come near: *going to Paris; bear to the right*. 9. For the attention, benefit, or possession of: *Tell it to me.* (The Am. Heritage Dictionary of the English Language, 1975.) To: a) in the direction of; toward [turn *to* the left;

		traveling *to* Pittsburgh] 15 with (a specified person or thing) as the recipient, or indirect object, of the action [listen *to* him; give the book *to* her] (Webster's New Collegiate Dictionary, 1974.) From: I. *a point of departure for motion, duration, distance, action, etc.; source or beginning of ideas, action, etc.* 4 with (a person or thing) as the maker, sender, speaker, teacher, etc. (Webster's New Collegiate Dictionary, 1974.) The terms "internet" and/or "communication link" refer to any suitable communication link which permit electronic communications. It should be understood that the term "internet" is not limited to "the Internet" or any other particular system or type of communication link. That is, the term "internet" is intended only to refer to any suitable communication system, including extra-computer system and intra-computer system communications. Examples of such communications systems include internal busses, local area networks, wide area networks, point-to-point shared and dedicated communications, infra-red links, microwave links, telephone links, CATV links, Satellite and radio links and fibre-optic links. The terms "internet" and/or **"communication link" can also refer to any suitable communication system for sending messages between remote locations, directly or via a third party communication provider such as AT&T. In this instance, messages can be communicated via telephone or facsimile or computer synthesized voice telephone messages with or without voice or tone recognition, or any other suitable communications technique**. ('028

		spec. 3:9-28)(emphasis added) *See, e.g.*, Figure 1. See also extrinsic evidence, including: "A distinction is made between names, addresses, and routes [4]. A name indicates what we seek. An address indicates where it is. A route indicates how to get there. The internet protocol deals primarily with addresses. It is the task of higher level (i.e., host-to-host or application) protocols to make the mapping from names to addresses. It is the task of lower level (i.e., local net or gateways) procedures to make the mapping from local net addresses to routes. *Internet Protocol*, p. 7. *See also* '028 file history, e.g., the following: Each of claims 8-14 [issued as claims 1-7] describe methods including a transactionor computer, a transactionee computer and a verifier computer. Thus, three computers (the transactionor computer, the transactionee computer and the verifier computer) are involved in validating the transaction. None of the references of record disclose, teach or even suggest a transaction validation method including three computers as recited in Applicants' claims 8-14 [issued as claims 1-7]. For example, the first method step in claim 8 [issued as claim 1] is recited as follows: transmitting a transaction initiation request requesting the initiation of an electronic transaction to a verifier computer from a transactionor computer, the transaction

		initiation request including one of a private identification code and a public identification code uniquely identifying the transactionor computer, and a public identification code uniquely identifying a transactionee computer [emphasis added]; Thus, when the transaction initiation request is transmitted from a first party to a second party, the address of a third party is included so that in a subsequent step the address of the third party can be used by the second party to send a signal to the third party. None of the references of record disclose or suggest this step.... Amendment, paper 14, pp. 2-3. Claim 13 [issued as claim 6] substantially corresponds in scope with claim 8 [issued as claim 1], except that the transaction initiation request is transmitted from the transactionor computer to the transactionee computer. Claim 13 [issued as claim 6] as amended, includes the step of transmitting a verification request including one of a private identification code and a public identification code uniquely identifying the transactionee computer and the public identification code uniquely identifying the transactionor computer from the transactionee computer to a verifier computer. None of the references of record disclose, teach or even suggest this step for the same reasons that none of the reference of record disclose the first step of claim 8 [issued as claim 1], as hereinbefore described. Amendment, paper 14, pp. 5-6.

		Including ***Construction:*** *containing within the body of the transmission* ***Support***: Ordinary meaning of the words consistent with specification definitions, disclaimers in prosecution history and the intrinsic evidence. Insert some support from spec *See also* '028 file history, Amendment, paper 14, pp. 2-7. **public identification code uniquely identifying the transactionor computer** ***Construction:*** *a publicly available label that provides one-of-a-kind identification of the computer used by the transactionor, but not of the transactionor himself/herself* ***Support***: Ordinary meaning of the words consistent with specification definitions, disclaimers in prosecution history and the intrinsic evidence. In one other embodiment, a Transaction Initiation Request requesting the initiation of an Electronic Transaction is inputted into the Transactionor computer 12. The Transaction Initiation Request is stored by the Transactionor computer 12 and then transmitted to the Verifier computer 16 from the Transactionor computer 12. **The Transaction Initiation Request includes Transaction Identification Codes uniquely identifying the Transactionor computer 12 and Transaction Identification codes uniquely identifying the Transactionee computer 14.**

		It should be understood that in this embodiment, the Transaction Identification Codes which describe one of the Transactionor computer 12, the Transactionee computer 14 and the Verifier computer 16 and which are transmitted between the Transactionor computer 12, the Transactionee computer 14 and the Verifier computer 16 could be either Private Identification Codes or Public Identification Codes, but not both the Private and Public Identification Codes. For example, the Transaction Identification Codes uniquely identifying the Transactionor computer 12 may include either the Public Identification Code uniquely identifying the Transactionor computer 12 or the Private Identification Code uniquely identifying the Transactionor computer 12, but not both the Public and Private Identification Codes uniquely identifying the Transactionor computer 12. ('028 spec., 13:1-25) (emphasis added) *See also* '028 file history, e.g., the following: Each of claims 8-14 [issued as claims 1-7] describe methods including a transactionor computer, a transactionee computer and a verifier computer. Thus, three computers (the transactionor computer, the transactionee computer and the verifier computer) are involved in validating the transaction. None of the references of record disclose, teach or even suggest a transaction validation method including three computers as recited in Applicants' claims 8-14 [issued as claims 1-7]. For example, the first method step in claim 8 [issued as claim 1] is recited as follows: transmitting a transaction initiation request

		requesting the initiation of an electronic transaction to a verifier computer from a transactionor computer, the transaction initiation request including one of a private identification code and a public identification code uniquely identifying the transactionor computer, and a public identification code uniquely identifying a transactionee computer [emphasis added]; Thus, when the transaction initiation request is transmitted from a first party to a second party, the address of a third party is included so that in a subsequent step the address of the third party can be used by the second party to send a signal to the third party. None of the references of record disclose or suggest this step.... Amendment, paper 14, pp. 2-3. Claim 13 [issued as claim 6] substantially corresponds in scope with claim 8 [issued as claim 1], except that the transaction initiation request is transmitted from the transactionor computer to the transactionee computer. Claim 13 [issued as claim 6] as amended, includes the step of transmitting a verification request including one of a private identification code and a public identification code uniquely identifying the transactionee computer and the public identification code uniquely identifying the transactionor computer from the transactionee computer to a verifier computer. None of the references of record disclose, teach or even suggest this step for the same reasons that none of the reference of record disclose the first step of claim 8 [issued as claim 1], as hereinbefore described.

		Amendment, paper 14, pp. 5-6. *See also* extrinsic evidence, including: Care must be taken in mapping internet addresses to local net addresses; a single physical host must be able to act as if it were several distinct hosts to the extent of using several distinct internet addresses. Some hosts will also have several physical interfaces (multi-homing). That is, provision must be made for a host to have several physical interfaces to the network with each having several logical internet addresses. *Internet Protocol*, p. 7.
receiving by the transactionee computer the transaction initiation request;		No additional constructions necessary for this term.
transmitting a verification request requesting verification of the transaction from the transactionee computer to a verifier computer **in response to** the transactionee computer receiving the transaction initiation request, the verification request including one of a private identification code and a public identification code uniquely identifying the transactionee computer and the public identification code uniquely identifying the	**in response to**	**<u>in response to</u>** ***Construction:*** *in reply to, and on the basis of information received in, a previously received message; in this element, in reply to and on the basis of the information contained in the transaction initiation request* ***Support***: Ordinary meaning of the words consistent with specification definitions, disclaimers in prosecution history and the intrinsic evidence. Response: 3. Reply. (McGraw-Hill Electronics Dictionary, 5th ed., 1994.) Response: 1. Quantitative expression of the output of a device or system as a function of the input, under conditions which must be explicitly state. The response characteristics, often presented graphically,

transactionor computer;		gives the response as a function of some independent variable such as frequency or direction. Response: 1. *The* act of responding; an answering. 2. A reply or answer. Respond: 1. To make a reply or answer. 2. To act in return or in answer. (The Am. Heritage Dictionary of the English Language, 1975.)
receiving the verification request by the verifier computer;		No additional constructions necessary for this term.
transmitting an acknowledgement request requesting acknowledgement of the electronic transaction from the verifier computer to the transactionor computer in response to the verifier computer receiving the verification request;		No additional constructions necessary for this term.
receiving the acknowledgement request by the transactionor computer;		No additional constructions necessary for this term.
transmitting an acknowledgement response **indicating one of a valid electronic transaction and an invalid electronic transaction** from the transactionor computer to the verifier computer in response to the transactionor computer	**indicating one of a valid electronic transaction and an invalid electronic transaction** **the private identification code uniquely identifying**	**indicating one of a valid electronic transaction and an invalid electronic transaction** ***Construction:*** *signifying that the electronic transaction is either (1) binding or (2) not binding on the transactionor.* ***Support***: Ordinary meaning of the words consistent with specification definitions, disclaimers in prosecution history and the intrinsic evidence.

receiving the acknowledgement request, the acknowledgement response including **the private identification code uniquely identifying the transactionor computer**;	**the transactionor computer**	Indicate: 2. To serve as a sign, symptom, or token of; signify. Valid: 3. Legally sound and effective; incontestable; binding: *a valid title. Logic.* b. Correctly inferred or deduced from a premise: *a valid conclusion.* Transaction: 2. Something transacted; especially, a piece of business. (The Am. Heritage Dictionary of the English Language, 1975.) Transaction: A collection of related messages designed to complete (in so far as this is possible) the intention of the initiator of the original message, and normally concluded by a debit or credit transaction. (Interchange Message Specification for Debit and Credit Card Message Exchange Among Financial Institutions, ANSI X9.2 – 1988, p. 8.) The Transactionor computer 12 receives the Acknowledgement Request and in response thereto, stores and transmits an Acknowledgement Response indicating one of a valid Electronic Transaction and an invalid Electronic Transaction to the Verifier computer 16. ('028 spec. 13:49-53) *See also* Extrinsic evidence, e.g., the following: "The payment-query message 140 requests the buyer 20 to respond with one of three possible replies: 'yes', 'no', or 'fraud.'" U.S. Patent 5,757,917 to Rose, col. 8, ll. 62-64.

		the private identification code uniquely identifying the transactionor computer ***Construction:*** *a one-of-a-kind and non-public identifier of the computer used by the transactionor, but not of the transactionor him/herself* ***Support***: Ordinary meaning of the words consistent with specification definitions, disclaimers in prosecution history and the intrinsic evidence. In one other embodiment, a Transaction Initiation Request requesting the initiation of an Electronic Transaction is inputted into the Transactionor computer 12. The Transaction Initiation Request is stored by the Transactionor computer 12 and then transmitted to the Verifier computer 16 from the Transactionor computer 12. **The Transaction Initiation Request includes Transaction Identification Codes uniquely identifying the Transactionor computer 12** and Transaction Identification codes uniquely identifying the Transactionee computer 14. It should be understood that **in this embodiment**, the **Transaction Identification Codes which describe one of the Transactionor computer 12**, the Transactionee computer 14 and the Verifier computer 16 and which are transmitted between the Transactionor computer 12, the Transactionee computer 14 and the Verifier computer 16 could be either Private Identification Codes or Public Identification Codes, but not both the Private and Public Identification Codes. For example, **the Transaction Identification Codes uniquely identifying the Transactionor computer 12** may

		include either the Public Identification Code uniquely identifying the Transactionor computer 12 or **the Private Identification Code uniquely identifying the Transactionor computer 12**, but not both the Public and Private Identification Codes uniquely identifying the Transactionor computer 12. ('028 spec. 13:1-25) (emphasis added) *See also* '028 file history, e.g., the following: Each of claims 8-14 [issued as claims 1-7] describe methods including a transactionor computer, a transactionee computer and a verifier computer. Thus, three computers (the transactionor computer, the transactionee computer and the verifier computer) are involved in validating the transaction. None of the references of record disclose, teach or even suggest a transaction validation method including three computers as recited in Applicants' claims 8-14 [issued as claims 1-7]. For example, the first method step in claim 8 [issued as claim 1] is recited as follows: transmitting a transaction initiation request requesting the initiation of an electronic transaction to a verifier computer from a transactionor computer, the transaction initiation request including one of a private identification code and a public identification code uniquely identifying the transactionor computer, and a public identification code uniquely identifying a transactionee computer [emphasis added]; Thus, when the transaction initiation request is transmitted

		from a first party to a second party, the address of a third party is included so that in a subsequent step the address of the third party can be used by the second party to send a signal to the third party. None of the references of record disclose or suggest this step.... Amendment, paper 14, pp. 2-3. Claim 13 [issued as claim 6] substantially corresponds in scope with claim 8 [issued as claim 1], except that the transaction initiation request is transmitted from the transactionor computer to the transactionee computer. Claim 13 [issued as claim 6] as amended, includes the step of transmitting a verification request including one of a private identification code and a public identification code uniquely identifying the transactionee computer and the public identification code uniquely identifying the transactionor computer from the transactionee computer to a verifier computer. None of the references of record disclose, teach or even suggest this step for the same reasons that none of the reference of record disclose the first step of claim 8 [issued as claim 1], as hereinbefore described. Amendment, paper 14, pp. 5-6.
receiving the acknowledgement response by the verifier computer;		No additional constructions necessary for this term.
transmitting a verification response indicating one of a valid electronic transaction and an invalid electronic		No additional constructions necessary for this term.

transaction from the verifier computer to the transactionee computer in response to the verifier computer receiving the acknowledgement response;		
and receiving the verification response by the transactionee computer and executing the electronic transaction in response to the transactionee computer receiving the verification response indicating a valid electronic transaction.		No additional constructions necessary for this term.

Resume of Michael Ian Shamos

Education

A.B. (1968) Princeton University (Physics). Thesis: "An Absorber Theory of Gravitational Radiation". Advisor: John A. Wheeler.

M.A. (1970) Vassar College (Physics). Thesis: "An Absorber Theory of Acoustical Radiation." Advisor: Morton A. Tavel.

M.S. (1972) American University (Technology of Management).

M.S. (1973) Yale University (Computer Science).

M.Phil. (1974) Yale University (Computer Science).

Ph.D. (1978) Yale University (Computer Science). Thesis: "Computational Geometry". Thesis committee: David Dobkin, Martin H. Schultz, Stanley C. Eisenstat.

J.D. (1981) Duquesne University, *cum laude.*

Foreign Languages

French, Russian (good reading and technical translation skills, fair conversational ability).

Academic Experience

Distinguished Career Professor, Institute for Software Research International and Language Technologies Institute, School of Computer Science, Carnegie Mellon University (2001-). Principal Systems Scientist (1998-2001). Principal Lecturer (2002-2003). Teaching Professor (2003-). Faculty, Tepper School of Business, Carnegie Mellon University (1999-).

Co-Director, Carnegie Mellon Institute for eCommerce (1998-). Vice-Chair, University Research Council (2000-2002).

Director, Universal Library, Carnegie Mellon University (1998-).

Visiting Professor, Department of Electrical and Electronic Engineering, The University of Hong Kong (2001-).

Adjunct Faculty, Carnegie Mellon University, Department of Computer Science (1981-1998). Formerly Assistant Professor, Carnegie Mellon University, Departments of Computer Science and Mathematics (1975-81), Dept. of Statistics (1978-81).

Recent courses taught (Carnegie Mellon):
Algorithm Design and Analysis 15-451 (Comp. Sci.)
Intellectual Capital and its Protection 45-886 (MBA)
Ecommerce Technology 20-751 (MSEC program)
Electronic Payment Systems 20-753 (MSEC program)
Ecommerce Law and Regulation 46-840 (MSEC program)

Honors and Awards

Fellow, Society of the Sigma Xi (1974-83).

IBM Fellowship, Yale University (1974–75).

SIAM National Lecturer (1977–78).

Distinguished Lecturer (computer science), University of Rochester (1978); McGill University (1979).

Duquesne University Law Review (1980–81).

Black & White Scotch Achiever's Award (first annual, 1991, for contributions to bagpipe musicography).

Industry Service Award of the Billiard and Bowling Institute of America, 1996 (for contributions to billiard history).

Editorships

Editor-in-Chief, Journal of Privacy Technology (2003-).

Member of Editorial Board, *Electronic Commerce Research Journal* (2000-).

Member of Editorial Board, *Pittsburgh Journal of Technology, Law and Policy* (1999-).

Dr. Shamos has reviewed scientific papers for *Communications of the ACM*, *Mathematical Reviews*, *IEEE Computer*, *IEEE Transactions on Computers*, *Information Processing Letters*, *Journal of the ACM* and the *Journal of Computational Physics*.

Contributing Editor, *Billiards Digest* magazine (1990-).

Legal Experience

Special Counsel, Reed Smith LLP (2000-2003), electronic commerce law.

Shareholder, The Webb Law Firm (1996-2000), intellectual property law. Associate (1990-95).

Private practice of law (1987-90), intellectual property

Associate, law firm of Buchanan, Ingersoll, P. C. (1985-87), Emerging Companies Department.

General Counsel, Carnegie Group, Inc. (1983-85), artificial intelligence company.

Private practice of law (1981-83), computer law.

Bar Admissions

Supreme Court of Pennsylvania (1981–).

United States District Court for the Western District of Pennsylvania (1981–).

United States Patent and Trademark Office (1981–).

United States Tax Court (1982–).

United States Court of Appeals for the Armed Forces (1982–).

United States Court of Appeals for the Third Circuit (1982–).

United States Supreme Court (1985–).

United States Court of Appeals for the Federal Circuit (1985–).

Expert Witness

Dr. Shamos serves as an expert witness in computer software and electronic voting cases. His clients include:

Bertelsmann AG
Clubcorp, Inc.
C. W. Communications (Computerworld)
eBay, Inc.
Freemarkets, Inc.
INCO Alloys
Levinson Steel
Powerquest Corp.
The Princeton Review, Inc.
20th Century Fox
UBS Warburg
Universal Studios

Legislative Testimony

Testimony before the Texas Legislature concerning electronic voting, Austin, Texas, 1987. Result: passage of the Texas Electronic Voting Law.

Invited testimony before the British House of Lords, Subcommittee B of the European Union Committee, April 20, 2000. Subject: European regulation of eCommerce. View testimony.

Testimony before the Pennsylvania Legislature State Government Committee concerning electronic voting, Philadelphia, March 10, 2004.

Testimony before the United States Commission on Civil Rights concerning electronic voting, Washington, DC, April 9, 2004.

Arbitration

Dr. Shamos has served as an arbitrator in computer-related disputes for the American Arbitration Association.

Electronic Voting

Dr. Shamos has served as an examiner of electronic voting systems and consultant on electronic voting.

Consultant to the Pennsylvania Secretary of the Commonwealth (2004-).

Project SERVE Security Peer Review Group (2003).

Attorney General's Designee for electronic voting examinations, State of Texas (1987-2000).

Attorney for Counsel to the Secretary of the Commonwealth, Commonwealth of Pennsylvania. (1998-2000); Statutory Examiner for electronic voting, Commonwealth of Pennsylvania (1980-1996).

Consultant to Montgomery County, Pennsylvania (1996).

Consultant to the Secretary of State of Nevada (1996).

Consultant to the Delaware Legislature (1989).

Business Experience

President, Unus, Inc., database publishing software (formerly Unilogic, Ltd.) (1990-1992)

President, Lexeme Corporation (1984-87), software language translation products.

Managing Partner, Shamos and Tchen (1978-82), computer consulting firm.

Supervisory Programmer, National Cancer Institute (1970-72), while a commissioned officer in the United States Public Health Service (O-3).

Associate Engineer, IBM Corporation (1968-70), design of manufacturing information systems.

Consulting

Morgan Stanley Dean Witter (2000-2002).

McKinsey & Co. (1999-2001).

Bell Atlantic Corporation (1999-).

Directorships

Unilogic, Ltd. (1979–87) (later Unus, Inc. d/b/a Cygnet Publishing Technologies, 1987-). Database publishing software.

The Billiard Archive (1983–). Historical nonprofit foundation.

Lexeme Corporation (1984-1987). Computer source language translation.

Insurance Technology Corporation (1992–1995). IT consulting for the insurance industry.

Personal Data

Date of birth: April 21, 1947.

Married to Julie Shamos (formerly Julie Van Allen), August 12, 1973.

Children: Josselyn (born May 20, 1982), Alexander (born August 3, 1984).

Military Status: Veteran (Commissioned Officer, U.S. Public Health Service, 1970-72).

Contact Information

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Home Address:
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Home Telephone: 412-681-8398 Home Fax: 412-681-8916

Publications

SCIENCE

Books

1. *Computational Geometry: An Introduction*, with F. P. Preparata. Springer-Verlag (1985, revised ed., 1991), 390 pp. ISBN 0387961313. According to Citeseer, this is the 28th most frequently cited work in computer science.

2. *Vyichislitel'naya Geometria: Vyedyeniye*. Russian translation of "Computational Geometry: An Introduction." Moscow: Mir Publishers (1989). ISBN 5030010416.

3. *Computational Geometry: An Introduction*, with F. P. Preparata. Japanese edition translated by T. Asano and T. Asano. Soken Shuppan (Jul. 1992). ISBN4795263213.

4. *Handbook of Academic Titles*. 198 pp. (Nov. 2002). An encyclopedia of various academic designations used at over 1000 colleges and universities in the United States.

5. *Geometria obliczeniowa. Wprowadzenie.* Polish translation of "Computational Geometry: An Introduction." Warsaw: Helion (2003) 392 pp. ISBN 83-7361-098-7.

Articles

1. "On the Piezoelectric Effect in Bone," with M. H. Shamos and L. S. Lavine. *Nature* **197**:81 (1963).

2. "An Absorber Theory of Acoustic Radiation," with M. A. Tavel. *Journal of the Acoustical Society of America* **54**:46–49 (1973).

3. "Problems in Computational Geometry." Unpublished book manuscript (1974, revised 1977). Distributed in photocopy.

4. "Geometric Complexity." *Proceedings of the Seventh Annual ACM Symposium on Automata and Theory of Computation* (May 1975) 224–233.

5. "Closest-point Problems," with D. J. Hoey. *Proceedings of the Sixteenth IEEE Symposium on Foundations of Computer Science* (Oct. 1975) 151–162.

6. "Divide and Conquer in Multidimensional Space," with J. L. Bentley. *Proceedings of the Eighth Annual ACM Symposium on Automata and Theory of Computing* (May 1976) 220–230.

7. "Geometric Intersection Problems," with D. J. Hoey. *Proceedings of the Seventeenth Annual IEEE Symposium on Foundations of Computer Science* (Oct. 1976) 208–215.

8. "Lower Bounds from Complex Function Theory," with G. Yuval. *Proceedings of the Seventeenth Annual IEEE Symposium on Foundations of Computer Science* (Oct. 1976) 268–273.

9. "Geometry and Statistics: Problems at the Interface." In *Algorithms and Complexity: New Directions and Recent Results*, J. F. Traub, ed., Academic Press (1976) 251–280.

10. "Divide and Conquer for Linear Expected Time," with J. L. Bentley. *Information Processing Letters* 7 (1977) 87–91.

11. "A Problem in Multivariate Statistics: Algorithm, Data Structure, and Applications," with J. L. Bentley. *Proceedings of the Fifteenth Allerton Conference on Communications, Control and Computers* (Sep. 1977) 193–201.

12. "Optimal Algorithms for Structuring Geographic Data," with J. L. Bentley. *Proceedings of the Harvard Conference on Topological Data Structures for Geographic Information Systems* (Oct. 1977) 43–51.

13. "Computational Geometry." Ph.D. Thesis, Yale University (1978). University Microfilms, Ann Arbor, MI.

14. "On Time and Space," with A. R. Meyer. In *Perspectives on Computer Science*, A. K. Jones, ed. Academic Press (1978).

15. *Combinatorics on Graphs I: Graph Polynomials*. Unpublished book manuscript (1978).

16. "Robust Picture Processing Operators and Their Implementation as Circuits." *Proceedings of the Fall 1978 Workshop on Image Processing*, Carnegie Mellon University (1978).

17. "A practical system for source language translation," with T. R. Kueny and P. L. Lehman. *Proceedings of the National Conf. on Software Reuseability and Maintainability*, pp. B-1 – B-12, Washington, DC (Sep. 1986).

18. "The Early Years of Computational Geometry – A Personal Memoir." *Advances in Discrete and Computational Geometry* (B. Chazelle, J. E. Goodman, and R. Pollack, eds.), *Contemporary Mathematics*, Amer. Math. Soc., Providence (1998).

DIGITAL LIBRARIES

Reports

1. "Japanese Digital Information Policy, Intellectual Property and Economics," in "Digital Information Organization in Japan," International Technology Research Institute (1998).

ELECTRONIC VOTING

Articles

1. "Voting System Certification — An Examiner's View." Invited paper presented at the Election Center Conference, Reno, Nevada (Sep. 1989).

2. "Electronic Voting — Evaluating the Threat." Proc. Third ACM Conf. on Computers, Freedom & Privacy, San Francisco, CA (Mar. 1993).

3. "Paper v. Electronic Voting Records — An Assessment." Proc. 14th ACM Conf. on Computers, Freedom & Privacy, Berkeley, CA (Apr. 1994).

Testimony

1. Testimony before the State Government Committee of the Pennsylvania House of Representatives, Philadelphia , March 10, 2004.

2. Testimony before the United States Commission on Civil Rights, Washington, DC , April 9, 2004.

BILLIARDS

Books

1. *Pool.* New York: Mallard Press division of Bantam-Doubleday-Dell Promotional Book Company (Aug. 1991). 128 pp. ISBN 0-7924-5310-7.

2. *Le billard et le billard américain*. Paris: Minerva, 1992, reprinted 1997. 128 pp. Translation by Jean-Yves Prate of the author's American book, *Pool*. ISBN 2–8307–0160–7 (1992), 2-8814-3135-6 (1997).

3. *The Illustrated Encyclopedia of Billiards*. New York: Lyons & Burford (1993). 310 pp. ISBN 1-55821-219-1.

4. *Pool Snooker Carambola*. Padua: Facto Edizioni (1993). 128 pp. Italian translation of *Pool*. Translated by Elisabetta Bezzon. ISBN 88-85860-20-6. The only English-language billiard book ever published in Italian.

5. *Pool*. New York: Friedman/Fairfax (Jun. 1994). 128 pp. ISBN 1-56799-061-4. Paperback edition of the author's 1991 *Pool*.

6. *Shooting Pool: The People, the Passion, the Pulse of the Game*, with photographs by George Bennett. New York: Artisan (Jun. 1998). 144 pp. ISBN 1-885183-95-X. A Book-of-the-Month Club bonus selection (Fall, 1998).

7. *Setting the Stage for Fifty Years*. Coralville, IA: Billiard Congress of America (Jun. 1998). 88 pp. A history of the Billiard Congress of America.

8. *The New Illustrated Encyclopedia of Billiards*. New York: Lyons Press (1999). 320 pp. ISBN 1-55821-797-5. An expanded and revised edition of *The Illustrated Encyclopedia of Billiards*.

9. *The Complete Book of Billiards*. New York: Gramercy Books (2000). 306 pp. ISBN 0-517-20869-5. Reissue of author's 1993 *The Illustrated Encyclopedia of Billiards*.

In Preparation

SCIENCE

Books

1. *A Catalog of the Real Numbers*. A list, patterned after Sloane & Plouffe, The Encyclopedia of Integer Sequences, Academic Press (1995). Over 8000 interesting real numbers arranging in lexical order by decimal expansion, with accompanying formulas.

2. *Handbook of Academic Titles*.

Articles

1. *Overcounting Functions*. A systematic method of transforming certain multiple summations into single summations, with new number-theoretic results.

2. *Property Enumerators and a Partial Sum Theorem*. A new result allowing rapid symbolic evaluation of certain types of double summations.

LAW

Books

1. *A Dictionary of American Intellectual Property*.

Invited Talks

ELECTRONIC COMMERCE

"The U.S., Korea and the Internet Bubble." Korea International Trade Association (Seoul, July 2003).

SCIENCE AND LAW

"Digital Property in the 21st Century." Keynote address for the Spring Meeting of the American Intellectual Property Law Association, Pittsburgh, PA (May 2000).

"Who Owns This Algorithm?" Carnegie Mellon University (Nov 1991); Microelectronics and Computer Corporation (Jan. 1992); Univ, of Texas at Austin (Jan. 1992); UCLA (Feb. 1992).

"New Computer Technology and Its Application to Worker's Compensation." Forum IV, Newport Beach, CA (Feb. 1992).

"The Office of the Future, If There Is One." 1994 IAIABC Conf., Pittsburgh, PA (Sep. 1994).

"The Fringes of Infringement." University of Texas, Austin, TX (Sep. 1995).

"The Arts and the Internet." Allegheny County Bar Association Continuing Legal Education course (June 26, 1996).

"The Universal Information Resource." Inventing the Future, Symposium in Honor of Raj Reddy's 60th Birthday, Carnegie Mellon University, Pittsburgh, PA (May 1998).

"The Universal Library." University of Texas at Austin (Sep. 1998)

"The Universal Library and Its Role in Scientific Information." Keynote address to the RNA Society symposium on Emerging Sources of RNA Information, Arlington, VA (Dec. 8, 1998).

"Digital Property in the 21st Century." Luncheon address to the American Intellectual Property Law Association, Pittsburgh, PA (May. 2000).

"The Future of eCommerce." Address to the Association for Corporate Growth, Pittsburgh, PA (Dec. 2001).

"Copyright Protection and Distance Learning." Hong Kong Intellectual Property Office (Feb. 2002).

"Surprises in Experimental Mathematics." Carnegie Mellon University Mathematics Seminar (Feb. 2002).

ELECTRONIC VOTING

"Voting System Certification — An Examiner's View." Election Center Conference, Reno, Nevada (Sep. 1989).

"Electronic Voting — Evaluating the Threat." Third Conf. on Computers, Freedom and Privacy, San Francisco, CA (Mar. 1993).

"What's Happing in Florida?" Carnegie Mellon University (Nov. 2001)."

Electronic Voting: The Technology of Democracy." Hong Kong University (Feb. 2004).